UNITED
NATIONS

Framework Convention
on Climate Change

Distr.
RESTRICTED

FCCC/IDR.2/NLD
31 May 2001

ENGLISH ONLY

THE NETHERLANDS

Report on the in-depth review of the second national communication of the Netherlands and its update

Review team:

Marina Shvangiradze (Georgia)
Jon Rognwaldson (Iceland)
Vitaly Matsarski (UNFCCC secretariat, coordinator)

Also available on the World Wide Web (http://www.unfccc.int)

GE.01-

I. INTRODUCTION AND NATIONAL CIRCUMSTANCES

1. The secretariat received the second communication (NC2) from the Netherlands in April 1997 (it was one of the few Annex I Parties that submitted their communications on time) and an update to the NC2 in May 1998. The reasons for submitting the update are given in its preface and refer to a number of major policy developments that took place after publication of the original second communication. As a result, the chapters on national circumstances, greenhouse gas (GHG) inventories, policies and measures, and projections were revised in the update. After the visit, other important information on the implementation of the Convention reached the secretariat and was taken into account by the review team in this report.

2. The secretariat carried out an in-depth review of the NC2 and its update between September 1998 and September 2000. This review included a visit by a review team during the week of 27 October 1998 to 2 November1998. The review team consisted of Ms Marina Shvangiradze (Georgia), Mr. Jon Rognwaldson (Iceland) and Mr. Vitaly Matsarski (UNFCCC secretariat, coordinator).

3. The Netherlands is a small, low-lying and densely populated country. It has a land area of 34,000 km^2 with about 24 per cent of the land lying below sea level. About 27 per cent of the land is devoted to urban, infrastructure and other uses, 9 per cent to forest and 59 per cent to agriculture, the remaining 5 per cent being natural land . The Netherlands has a coastal climate strongly influenced by the oceanic effect, making its climate much milder on average than that of other countries at the same latitude. Over the last 100 years, an increase in temperature of about one degree has been measured, with some of the warmest years occurring in the last decade.

4. The population is concentrated on the western rim of the country in and around the cities of Amsterdam, Rotterdam, The Hague and Utrecht. In the period 1980 to 1997, the population increased by 10.3 per cent to 15.6 million. The annual population growth of about 0.5 per cent is relatively high in comparison with most other European Community (EC) countries and forecasts indicate that it will continue to grow at a level above the EC average. In the same period, the population density also increased by about 9.6 per cent to around 460 persons per km^2. In addition to population growth, the Netherlands is facing other demographic trends that put pressure on the environment. These include a decrease in the number of people per household (from 2.8 in 1980 to 2.4 in 1997), and a general increase in the number of households, with a larger share of single occupier households (from 24 per cent to 31 per cent). This is an important trend for the Netherlands because a significant part of its energy consumption is used for space heating.

5. Gross domestic product (GDP) increased by about 18.5 per cent between 1990 and 1997 (at 1990 prices). The net energy consumption increased from 2,815 petajoules (PJ) in 1990 to 3,071 PJ in 1997, an increase of 9 per cent, or half of the GDP growth rate. The Netherlands' fuel mix differs from that of other EC countries. It has a high share of natural gas (about 45 per cent of total end-use for energy purposes) and a low share of coal. In 1997 compared with 1990, the consumption of coal increased by 2 per cent, of oil by 10 per cent and of natural gas by 15 per cent. The amount of electricity produced from renewable energy sources increased

threefold in the period 1990-1997 and accounted for about 4 per cent of the total in 1997. Electricity production rose by 8 per cent during the same period, yet the Netherlands remains a net importer of electricity. According to government officials, the efficiency of conventional gas-fired power plants improved from 40 to 46 per cent between 1985 and 1996. The newest gas-fired power plants have an efficiency of 55 per cent. The efficiency of coal-fired plants also increased over the same period from 38 to 41 per cent. The increased use of cogeneration affects energy consumption trends in industry and agriculture as well as fuel consumption in the public power generation sector.

6. Transportation is an important element of the Netherlands' economy (over 7 per cent of GDP in 1997), the number of vehicle-kilometres having increased by 24 per cent between 1990 and 1997. The port of Rotterdam is a major distribution centre for northwest Europe and the Rotterdam area also contains some of the largest oil refineries in the world. Schiphol airport (near Amsterdam) provides transit services and is a major gateway to Europe. In addition, the Netherlands has a well developed infrastructure for transport, including public transport. Agriculture, especially dairy farming and horticulture, is an important sector of the Netherlands economy. Due to a decrease in the number of beef cattle, sheep and goats, whilst the pig population remained constant, the overall number of livestock decreased by over 6 per cent. However, the animal population remained significant at over 6 million.

7. Comprehensive environmental policies is accomplished through the National Environmental Policy Plans (NEPP); NEPP 3 was published in February 1998. The preparation of such plans involves all ministries with climate change responsibilities and accountability. Other key documents used to help evaluate climate change policy and develop national communications included: the Third White Paper on Energy Policy, the Second Memorandum on Climate Change, the National Environmental Outlook 1995-2020 and the annual Environment Programme.

8. The Netherlands comprises 12 provinces and over 625 municipalities (responsible for granting licences and permits). The national government is responsible for legislation and policies. The Government is made up of 15 ministries, with the Minister for the Environment, Housing and Spatial Planning (VROM) responsible for coordination of environmental policy. Other ministries such as economic affairs, agriculture, transport and public works contribute to the integration of environmental policies and endorse the NEPP in their areas of responsibility.

9. The Netherlands has set a range of targets for reducing GHG emissions, the objective being to reduce carbon dioxide (CO_2) emissions by 3 per cent, methane (CH_4) by 10 per cent, nitrogen oxides (NO_x) by 55 per cent, and non-methane volatile organic compounds (NMVOC) by 60 per cent in 2000 relative to 1990, while stabilizing nitrous oxide (N_2O) emissions. According to the EC burden-sharing agreement related to the commitments under the Kyoto Protocol, the Netherlands is expected to reduce its aggregate GHG emissions by 6 per cent in the first commitment period.

10. Climate change policy is developed through a comprehensive consensus-building approach involving all relevant federal departments and agencies, stakeholders, industry and

industry associations, and non-governmental agencies. It is guided by the Environmental Policy Act. Because of its tradition of consensus building, the moderate size of the country and the number of stakeholders, it is possible to implement measures such as voluntary agreements with industry, without necessarily applying a regulatory framework. This cooperative approach works alongside strong legal and economic measures.

11. The Netherlands has a history dating back to the early 1980s, of studying and collecting data on climate change in general and greenhouse gas emissions in particular. Today, climate change continues to have a high political priority. This is shown by the country's role in areas such as burden sharing and energy tax legislation and its renewed commitment to new policy and measures to reduce greenhouse gas emissions.

II. INVENTORIES OF ANTHROPOGENIC EMISSIONS AND REMOVALS

12. The reporting of GHG inventories in the NC2 improved compared to the NC1. The NC2 covered all major greenhouse gases and precursors, including CO_2, CH_4, N_2O, NO_x, carbon monoxide (CO), NMVOCs, sulphur dioxide (SO_2), and halocarbons such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and fluoroiodocarbons (FICs)

13. Scientific research on emission estimates is organized and funded through the National Research Programme, the NWO Global Change Priority Programme and the Centre for Climate Research. Emissions of HFCs, PFCs and SF_6 were calculated using consumption data. CO_2 emissions from anthropogenic sources were calculated using global warming potential (GWP) values for a time-horizon of 100 years.

14. Inventories were reported for the territory of the Netherlands, including a 12-mile zone from the coastline but excluding overseas territories. Emissions from offshore oil and gas production on the Netherlands' part of the continental shelf were included. Emissions from inland waters were also part of the national figures. Natural emissions were reported but not included in the national totals. CO_2 emissions from international aviation and sea transport were reported under bunker emissions and not included in the national totals as required by the UNFCCC guidelines. In general, Netherlands experts considered their national GHG inventory to be of high quality and believed that the existing procedures for collecting inventory data constituted a good basis on which a future national system, required by the Kyoto Protocol, could be built. The review team shared this opinion.

15. In September 1995, the Netherlands adopted the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories to calculate and report greenhouse gas emissions for all policy purposes. The inventory tables and graphs below are based on the publication *Greenhouse gas emissions in the Netherlands 1990-1996: updated methodology*, submitted to the secretariat in early 1998. This publication also served as a basis for discussions during the in-depth review. Inventory data contained in this publication differ from those submitted earlier because of recalculation for all reported years due to the changes in methodologies. These changes were described in the 1997 publication *Method for the*

calculation of GHG emissions. They mainly relate to the improved values for both activity data and emission factors.

16. Inventory data presented in this report are drawn from the most recent submission to the secretariat and cover 1990 to 1998. As a result of recalculations, CO_2 emissions in the 1990-1998 time-series appear to be about 4 per cent lower than in previous submissions. This is explained by the higher carbon storage in petrochemical products such as plastics. Recalculated CH_4 emissions were found to be about 15 per cent higher and emissions of N_2O about 25 per cent higher than reported earlier. The former increase was explained by better knowledge of emissions from landfills, whereas the latter was attributed to the results of new measurements in the chemical industry (in particular, for production of nitric acid, caprolactam and acrylonitrile).

17. The Netherlands used temperature-corrected figures for estimates of CO_2 emissions for internal purposes. Temperature-corrected values based on heating degree days were included together with actual data. This was done in an open and transparent way. However, in the following discussion only non-corrected figures are used.

18. Aggregate GHG emissions in the Netherlands in CO_2 equivalent were about 8 per cent higher in 1998 than in 1990. The shares of individual gases (using the 100-year GWP) in 1998 were about 77 per cent for CO_2 (74 per cent in 1990), 9 per cent for CH_4 (12 per cent in 1990), 9 per cent for N_2O (9 per cent in 1990), and 4 per cent for the other gases. In the period from 1990 to 1998, GHG emissions in the Netherlands in CO_2 equivalent increased for all major GHGs but methane (decrease of around 17 per cent). There was no clear pattern of emissions by sector, with some sectoral emissions changing significantly from year to year, e.g. small combustion.

19. Inventory data contained the following quantitative estimates of the uncertainties related to the GHG emissions. For CO_2: 2 per cent, for CH_4: 25 per cent, for N_2O: 35 per cent, for NO_x and NMVOCs: 25 per cent, for HFCs and SF_6: 50 per cent, and for PFCs: 100 per cent.

A. Carbon dioxide

20. The most important anthropogenic source of CO_2 was the combustion of fossil fuels, which constituted 98 per cent of the Netherlands total CO_2 emissions. Contributions to the total CO_2 emissions from fuel combustion in 1998 were as follows (numbers in parentheses are for 1990): energy and transformation sector about 32 per cent (32 per cent), industry about 24 per cent (26 per cent), transport about 19 per cent (18 per cent) and small combustion, which includes residential, commercial and agricultural activities, about 20 per cent (22 per cent). The remaining 5 per cent (2 per cent) was attributed to biomass burned for energy, and statistical differences.

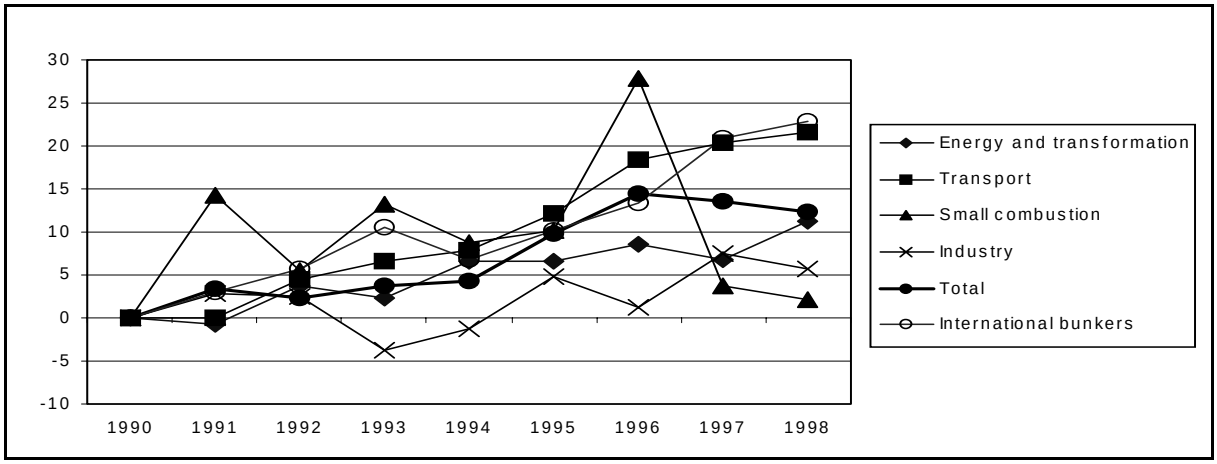
21. Information on CO_2 emissions by sector is provided in table 1, and trends in CO_2 emissions for 1990-1998 are presented in figure I. In the Netherlands, CO_2 emissions increased constantly from the economic crisis of 1982-1983 until 1996. It can be observed that total CO_2 emissions rose to about 185,000 Gg in 1996 compared with 161,400 Gg in 1990, an increase

of 14.6 per cent. In 1997-1998 they fell slightly, to 181,400 Gg in 1998, representing about 112 per cent of the 1990 level. The most important sectors affecting the emissions trend were the energy and transformation sector (32 per cent), the industrial sector (24 per cent), the small combustion sector (20 per cent) and transport (19 per cent). The most recent submission did not estimate emissions from waste for 1990 to 1994.

Table 1. Carbon dioxide emissions by source, 1990-1998 (Gg)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Energy and transformation	52 550	52 190	54 140	53 800	55 980	56 050	57 040	56 120	58 480
Transport	28 560	28 550	29 830	30 460	30 800	32 030	33 820	34 350	34 720
Small combustion	35 360	40 380	37 330	40 060	38 460	38 930	45 200	36 670	36 120
Industry	41 440	42 660	42 510	39 920	40 950	43 430	41 990	44 540	43 810
Industrial processes	1 900	1 500	1 300	1 200	1 400	1 600	1 800	1 700	1 500
Waste	-	-	-	-	-	1 600	1 900	2 500	2 300
Total	**161 360**	**166 910**	**165 210**	**167 450**	**168 340**	**177 130**	**184 790**	**183 230**	**181 370**
International bunkers	40 100	41 300	42 400	44 300	42 800	44 200	45 500	48 500	49 300
Removals by sinks	-1 500	-1 600	-1 600	-1 600	-1 700	-1 700	-1 700	-1 700	-1 700

Figure I. Carbon dioxide emissions by major source, percentage change relative to 1990



22. Estimates of the total CO_2 emissions were based on the figure for national energy consumption, equal to the bottom-up total of all energy use by sectors (total energy demand), plus the so-called statistical difference (defined as energy consumption not registered within any sector). The fuel corresponding to statistical differences was assumed to be entirely converted to CO_2. The team was informed that the statistical difference between supply and demand is usually smaller than 2 per cent. CO_2 emissions from energy use were calculated using a top-down method and included all combustion and process emissions from energy carriers. Aggregate emission factors were used for coal, oil and gas.

23. The team noted that emissions from the Netherlands' bunkers were relatively high compared with other national total carbon dioxide emissions and other European countries. The team was informed that this is due to the Rotterdam port, the world's largest marine bunker location, and Schiphol airport, Europe's largest aviation bunker location. Total emissions from international bunkers increased in the period 1990-1998 by almost 23 per cent, with emissions from aviation bunker fuels increasing by about 50 per cent.

24. The team was informed that, on average, due to the maturing of forests trees in the Netherlands were getting older and the afforested area was constantly increasing. In addition to that, fellings have been reduced in recent years and the net volume increment of biomass has increased from 16 million to 18 million cubic metres. The combination of these factors resulted in an increase in the sink capacity from about 1,500 Gg CO_2 in 1990 to about 1,700 Gg in 1998.

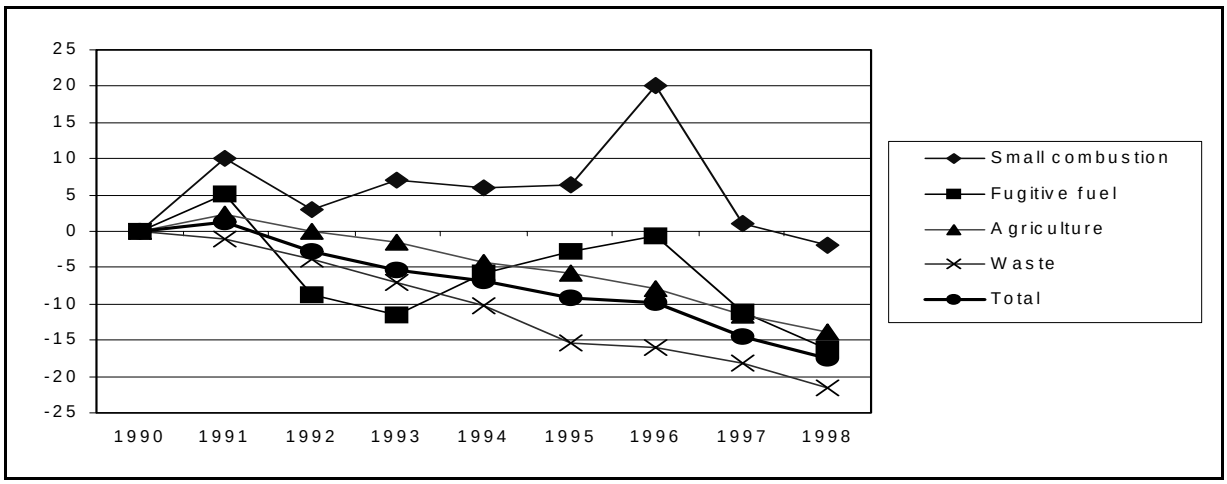
B. Methane

25. Total emissions of CH_4, as shown in table 2 and figure II, decreased by more than 17 per cent in the period 1990 to 1998. The main sources were waste, including landfills and waste water treatment installations, livestock and fuel production and processing. The most significant reductions were in emissions from waste (21 per cent in 1998 relative to 1990) and from the agricultural sector (14 per cent). Emissions from fuel combustion practically returned to the 1990 level after a significant increase in 1996 and fugitive fuel emissions decreased in the period 1990-1998 by around 16 per cent.

Table 2. Methane emissions by source, 1990-1998 (Gg)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Energy and transformation	3	3	4	3	4	5	6	3	4
Industry	4	4	5	3	3	3	2	2	2
Transport	8	7	7	6	6	6	6	5	5
Small combustion	20	22	21	21	21	21	24	20	20
Fugitive fuel	179	188	163	158	169	174	178	159	150
Industrial processes	3	4	4	5	5	5	6	3	3
Agriculture	505	517	505	497	483	476	465	446	435
Waste	568	562	546	528	510	481	478	465	446
Total	**1 290**	**1 307**	**1 255**	**1 221**	**1 201**	**1 171**	**1 165**	**1 103**	**1 065**

Figure II. Methane emissions by major source, percentage change relative to 1990



C. Nitrous oxide

26. Table 3 and figure III show that total N_2O emissions increased by about 9 per cent in the period 1990 to 1998. Emissions from transport in 1998 were slightly lower than in 1990, declining steadily after reaching a peak of a 12 per cent increase in 1995 relative to 1990. Emissions from agriculture increased by about 24 per cent in 1996 to fall to 17 per cent in 1998. The team noted that, although livestock numbers were decreasing as was the application of chemical fertilizer, the 1991 environmental legislation prescribing 100 per cent direct incorporation of manure in the soil by 1995 was a major factor contributing to a significant increase in agriculture N_2O emissions in 1990-1996. The side-effect of ammonia reduction policies has currently reached its maximum, which probably explains the decrease in agriculture emissions in 1997-1998 as a result of the decreasing number of livestock, as prescribed by the Common Agricultural Policy of the EC.

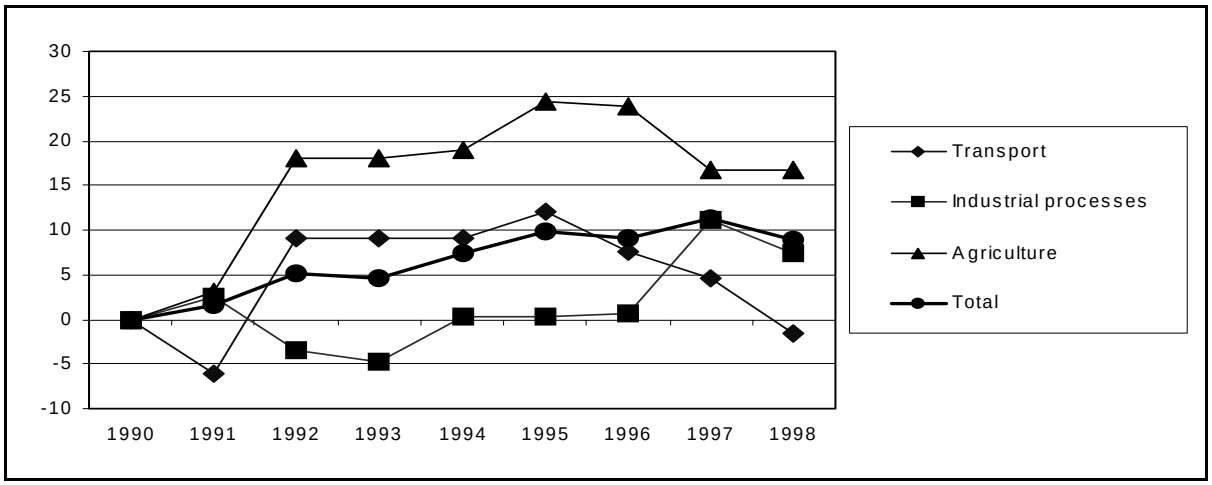
Table 3. Nitrous oxide emissions by source, 1990-1998 (Gg)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Transport	6.6	6.2	7.2	7.2	7.2	7.4	7.1	6.9	6.5
Industrial processes	31.5	32.3	30.4	30.0	31.6	31.6	31.7	35.0	33.8
Agriculture	22.2	22.9	26.2	26.2	26.4	27.6	27.5	25.9	25.9
Waste management	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6
Solvent and other product use	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4
Other (polluted surface waters)	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Total	**65.1**	**66.2**	**68.6**	**68.2**	**70.0**	**71.5**	**71.2**	**72.6**	**71.0**

27. The team noted that in addition to the standard reporting categories of the IPCC, two other non-negligible anthropogenic sources of N_2O were identified by the Netherlands experts. They were waste water or sewage treatment plants and polluted surface water. The team noted

that emissions from agricultural-waste burning and industrial combustion of wood and wood waste for energy purposes were currently not accounted for.

Figure III. Nitrous oxide emissions by major source, percentage change relative to 1990



D. New gases

28. The most recent inventory submission provided detailed estimates of HFC, PFC and SF_6 emissions based on actual emissions of the first two (with a breakdown by species) and potential emissions of the last-mentioned (see table 4). Compared with 1990, the total emissions of these gases on a CO_2-equivalent basis increased in 1997 by 28 per cent, falling then to about 15 per cent in 1998. This recent decrease is attributed to reduced emissions of HFCs (53 per cent above 1990 in 1997 compared with 30 per cent in 1998). The share of new gases in the total GHG emissions was about 5 per cent and is expected to grow. Data on consumption of HFCs and PFCs are reported to the VROM and emission estimates are calculated from these data. For SF_6 it was assumed that annual emissions are equal to annual consumption, and emission data for years subsequent to 1990 are obtained on the basis of the consumption trends in 1990. Officials indicated that the uncertainties of these estimates were about 50 per cent for HFCs and SF_6 and about 100 per cent for PFCs.

Table 4. Emissions of HFCs, PFCs and SF_6, 1990-1998 (million tonnes of CO_2 equiv.)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
HFC	5.1	4.9	4.6	5.1	6.4	6.7	7.5	7.9	6.7
PFC	2.5	2.4	2.2	2.2	2.2	2.1	2.1	2.2	2.2
SF_6	1.4	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.5
Total	**9.0**	**8.7**	**8.2**	**8.7**	**10.1**	**10.3**	**11.1**	**11.6**	**10.4**

III. POLICIES AND MEASURES

29. The Netherlands climate change policy covers emissions and removals of all major greenhouse gases. The national communications and the update outline several policies and measures currently in place as well as new measures. The policies range from standards and regulations to financial and fiscal incentives, long-term voluntary agreements (LTAs), education, and research and development. Policies tend to follow the interaction between different measures affecting the same sectors, in particular the use of energy taxes, voluntary agreements, subsidy schemes and information programmes targeting CO_2 emissions from main sectors. The sectors most relevant to the Netherlands climate change policy include energy, transport, agriculture and waste. Part of the national planning process includes a periodic update of policies and measures on the basis of monitoring and evaluation procedures. Intermediary organizations play an important role in the execution of supporting programmes such as LTAs. Organizations such as NOVEM act as intermediaries between the Government and target groups. Their role often includes monitoring of the progress made in specific policy areas.

30. Energy efficiency and conservation are at the heart of the Netherlands policy and measures. This is accomplished through LTAs and legislation such as the energy tax. LTAs are signed by the sectoral associations, individual firms and the Minister of Economic Affairs and are defined by energy efficiency targets. Companies involved in LTAs are required to report annually on energy efficiency and emission reductions. The data are submitted to NOVEM as operating agent and then quantified into an energy efficient index for the sector.

31. The update to the second national communication highlighted new funding and measures geared to helping meet its emission reduction targets. The new funds included f. 750 million towards climate change policies, a further f. 250 million for the CO_2 Reduction Plan and f. 500 million for measures such as activities implemented jointly (AIJ), a reduction plan for non-CO_2 greenhouse gases, domestic afforestation, energy-saving policies, emission reduction in the transportation sector and renewable energy.

32. In preparation for the third session of the Conference of Parties, the Government sent an information letter to the parliament indicating that it would be difficult to meet the objective of a 10 per cent reduction in CO_2, CH_4 and N_2O emissions in 2010. The letter also stated that additional policies would be required to meet the target of a 3 per cent reduction in emissions of CO_2 by the year 2000. The letter mentioned a gap of 35 to 37 million tonnes between the results of emission reductions under current policy and the national target. As a result of the negotiation of an EC burden-sharing agreement, the Netherlands is now considering additional measures which would allow it to fulfil its commitments under the Kyoto Protocol.

33. The discussions during the in-depth review focused on policies and measures related to particular GHGs rather than individual sectors of the economy since the majority of measures targeting a particular greenhouse gas usually cover more than one sector. The structure of this section thus follows the discussions during the review.

A. Energy and transformation

34. The main changes in the energy sector are expected to come from the liberalization of the electricity market and later the gas market. The Electricity Act adopted in 1998 envisaged full liberalization of power generation in 1999. The largest electricity consumers were to be able to freely choose their suppliers starting in 1999. The second group of large consumers will be able to do the same as of 2002, and households and small businesses will follow in 2007. The Netherlands electricity market will be open to competition in imports and exports. The Electricity Distribution Act, which is already in force, requires distribution companies to ensure environmentally sound energy consumption by themselves and their customers. The new Electricity Act imposes a similar obligation on producers, self-generators and suppliers of electricity to customers that are free to choose their suppliers.

35. In quantitative terms, the new Electricity Act envisaged that in 1999 liberalization would affect the 650 largest consumers of electricity, accounting for about 33 per cent of the electricity market. After 2002, an additional 55,000 customers accounting for a further 29 per cent of the electricity market will follow, while after 2007 more than 6 million small consumers accounting for the remaining 38 per cent of the energy market will be affected by the liberalization.

36. Similar developments are expected with the liberalization of the gas market. At the time of the visit it was not yet clear when the future Gas Act would come into force. However, the team was informed that the largest consumers already have a free choice of gas suppliers. There were about 150 such consumers using more than 10 million cubic metres per year, which amounts to about 46 per cent of the energy market. It is envisaged that an additional 55,000 smaller consumers (with a consumption of more than 170,000 cubic metres per year) will be affected by the liberalization after 2002 and more than 6 million small, mainly household, consumers covering the remaining 38 per cent of the gas market will follow suit after 2007.

37. The team was informed that, in addition to the liberalization of the electricity and gas markets, the Government is considering privatization of the production and distribution companies. Taken together, the liberalization and privatization would almost certainly lead to increased competition and as a consequence to lower energy prices, hence consumption could increase and lead to a rise in GHG emissions. For this reason, the Government is considering an increase in energy taxes to discourage energy consumption.

38. The Third White Paper on Energy Policy, published in 1996, reflected the need for sustainable development in an environment of increasing market liberalization and internationalization. It aimed at improving energy efficiency by 33 per cent over 25 years and increasing the share of renewables in total primary energy supply to 10 per cent by 2020. The 1998 Energy Conservation White Paper reviewed the opportunities for further energy conservation. New options include international benchmarking in energy-intensive industries, second generation long-term agreements for 2000 to 2010 and increased attention to energy conservation in the granting of environmental permits and decrees.

39. For electricity generation the objective is an increase in energy efficiency from 40 to 43 per cent in the period 1990 to 2000. This is expected to be accomplished by installing more efficient new plants and by expanding central heating cogenerated in electricity plants. In addition, the Netherlands plans to perform a fuel switch to 10 per cent wood in two coal-fired power plants by 2000. The terms of reference for investment in coal capacity have not changed, with coal being accorded a one-third share of total installed capacity in the public generation sector subject to a maximum of 6,000 MW energy. Nuclear energy is scheduled to be phased out over the coming years and the emphasis placed on developing green processes such as combined heat and power (CHP).

40. According to the Third White Paper on Energy Policy, installed CHP capacity should amount to 8,000 MW in 2000 with further growth anticipated in the future. It is envisaged to implement all new gas capacity for power generation in the form of CHP. In addition to existing application of this technology in large businesses, buildings and the major heat distribution grid, CHP is being adapted to suit the needs of smaller consumers at the level of individual homes or their clusters. Additional measures are being considered to ensure that CHP could still compete in situations of overcapacity, when other producers could reduce their prices compared to CHP-generated electricity. In this situation capacity costs could be charged over and above a basic price.

41. The Government envisages that the share of renewable energy in total energy supply will reach about 3 per cent in 2010 compared to less than 1.5 per cent in 1998. It was stressed that this target does not include possible additional measures. If additional measures are introduced to meet the Kyoto Protocol commitments, the share of renewable energy could reach 5 per cent in 2010, the target being 10 per cent in 2020. It was estimated that achieving the 5 per cent target would reduce CO_2 emissions by about 4 million tonnes.

42. To reduce emissions in the residential sector, the Netherlands introduced energy performance standards (improved insulation standards) in new residential and non-residential buildings. As well, a plan of action on optimal energy infrastructure was developed to enhance energy efficient construction in built-up areas, industry and horticulture.

43. The team was also informed of measures to help reduce CO_2 emissions from existing buildings. These measures include: voluntary agreements with intermediate organizations for renting in the social sector, subsidies and information campaigns to stimulate the further insulation of homes. As for measures discussed with the team for energy savings in existing buildings, they consist mainly of voluntary agreements to improve energy efficiency, and subsidies and information campaigns to stimulate the purchase of more efficient air conditioners and appliances.

B. Industry

44. Industry accounted for one third of total greenhouse gas emissions in 1997 and industrial emissions have remained almost constant since 1990 at 73 million tonnes CO_2 equivalent. Existing measures are expected to limit but not halt the growth of emissions to 2010.

45. The long-term agreement approach emerged primarily in response to new ideas about cooperative environmental management during the 1990s. LTAs are agreed between the Minister for Economic Affairs and the branch association representing firms in the sector. Since the Second Memorandum on Energy Conservation in 1993, LTAs have been the main instrument for energy conservation in the industrial sector. As of October 1998, 30 LTAs covering around 90 per cent of total industrial energy consumption had been completed, together with 12 LTAs in other sectors, involving over 130 firms in total. On average, the LTAs aim at an energy efficiency improvement of 20 per cent in 2000 compared with the level in 1989. The agreements typically concern the use of fossil fuels and external electricity, but not feedstock energy requirements. Targets are usually set at branch level and there is no formal burden-sharing among the firms in the sector. The agreements are supported by additional policies including subsidies aimed at research and development and pilot projects, tax breaks for investment in energy efficiency and information services. When a LTA is signed, a firm is then committed to prepare an energy conservation plan, which includes its individual strategy to reduce energy use. The firm's results must be reported annually to its branch association. Weak sanctions, such as warnings and ultimately expulsion from the LTA, can be imposed on firms or sectors in cases of non-compliance. Recent studies of pulp and paper manufacturing and the glass industry have shown that LTAs have stimulated firms to develop a more structured and systematic way of dealing with energy conservation, although there is no evidence that they have stimulated the development of new energy efficiency technologies. In 1997, the average energy efficiency improvement covered by 29 LTAs in the industrial sector amounted to 14.5 per cent compared with 1989. Based on straight line extrapolation, on average, the energy efficiency targets set out in the LTAs are likely to be reached. Studies have shown that about a third of the energy savings made by industry can be attributable to the effect of the LTAs. Total government costs for the preparation and implementation of the industrial energy conservation policy are estimated at f. 1,301 million in the period 1989 to 1999.

46. In addition to the LTAs, the Second Memorandum on Energy Conservation also gives priority to the light manufacturing strategy, designed to achieve energy savings by small enterprises unsuitable for LTAs and technology programmes intended to encourage new technology development. The overall package should result in an energy efficiency improvement of about 19 per cent in 2000, compared with 1989. Despite the success of the LTAs in improving energy efficiency, there has been a higher volume of industrial growth than anticipated and hence CO_2 emissions have continued to increase.

47. The 1999 Climate Policy Implementation Plan announced several new measures for the industrial sector including the participation of large, more energy-intensive companies in international benchmarking through which they should bring their standards up to the best in the world. Beginning in 2000, less energy-intensive companies will be asked to take all energy conservation measures that have an internal rate of return of at least 15 per cent. Those companies not participating in either of these schemes will have energy efficiency requirements in their environmental permits. Extra funds are being made available for energy investment tax credits and for projects in which residual heat is used. Energy savings are expected to reduce the growth in CO_2 emissions by 2.3 million tonnes in 2010. Agreements with aluminium producers will include simple process modifications to limit PFC emissions, where these have not already

been made, which should result in a saving of 1.2 million tonnes of CO_2 equivalent emissions by 2010. The recent installation of an afterburner at the only Netherlands HCFC plant should have reduced emissions from this source by 90 per cent by the end of 1999 or 2.5 million tonnes in terms of CO_2 equivalent emissions.

C. Transport

48. In the transport sector, the Netherlands experts indicated that they considered EC policies relevant in curbing emissions from vehicles. The Netherlands position on technical measures is that this is something that must be negotiated at a global or EC level because structural developments are dependent on the international automobile industry. However, the Netherlands indicated that it is also committed to finding national solutions.

49. Policies outlined in the NC2 and its update to reduce emissions include: intermodal shifts (from air to rail through the expansion of infrastructure), curbing the growth of freight vehicle-kilometres through agreements with companies and stimulating application of a broad range of technologies, an information campaign aimed at reducing the number of vehicle-kilometres through "loading together - working together", enforcing a reduced speed limit (80 km/h) for trucks, stricter enforcement of speed limits for cars, and an information campaign aimed at encouraging the consumer to purchase fuel-efficient automobiles.

50. Other policies and measures to reduce CO_2 emissions that were discussed with the team included: subsidies for research and development, subsidies to develop quieter, cleaner and more efficient means of transport in urban areas, research and development, pilot projects, fiscal schemes and agreements with industry to introduce econometers, on-board computers and cruise control in automobiles, and the improvement of public transport in and around cities. The team was informed of potential future initiatives including: tax incentives in favour of more fuel-efficient cars, increases in fuel prices, creation of a company transport plan, more stringent parking regulations, support for bicycle infrastructure and an energy tax.

51. Up to 1997, existing measures were estimated to have reduced the growth in GHG emissions from transport by about 1.2 million tonnes of CO_2 equivalent. Having risen from 31 million tonnes in 1990 to 36 million tonnes in 1997, GHG emissions from transport were expected to increase to 40 million tonnes in 2010 without additional policies. In response, measures in the 1999 Climate Policy Implementation Plan are supposed to reduce the growth in GHG emissions from transport by 2.7 million to 3.4 million tonnes of CO_2 equivalent in 2010. Eight out of the nine measures are targeted at reducing CO_2 through energy savings in road traffic. The other measure is targeted at N_2O emissions from catalytic converters on cars. More fuel-efficient cars are to be promoted through international agreements, in particular at the EC level such that new cars in 2008 should emit 25 per cent less CO_2 per kilometre than in 1995. All EC member States are required to introduce fuel consumption labelling for new cars, indicating also CO_2 emissions. Purchase of fuel-efficient cars will also be encouraged by differentiating the purchase tax by fuel efficiency. Legislation is being drafted that would introduce some form of road pricing in order to reduce traffic jams, which would also limit emissions. Changes in the tax system should be made to discourage the personal use of company

cars. There will also be stricter enforcement of speed limits, tax incentives for the purchase of instruments that monitor fuel consumption whilst driving and public information about correct tyre pressures for cars. Of the climate policy budget, f. 70 million is being used in the transport sector for projects including a stimulation programme for goods transport logistics efficiency. The Netherlands is promoting the adoption of legislation at the EC level by 2006 to curb N_2O emissions from
catalytic converters.

D. Agriculture

52. The agricultural sector is responsible for emissions of CO_2, mainly from greenhouse horticulture, CH_4, primarily from livestock, and N_2O from fertilizer application and, in total, accounted for 11 per cent of GHG emissions in 1997. Total emissions fell from 26 million tonnes in 1990 to 28 million tonnes in 1997, but in the absence of policies would be expected to reach 28 million tonnes of CO_2 equivalent in 2010.

53. Natural gas in used for both heating greenhouses and producing CO_2 to encourage plant growth. A new environmental covenant covering the period 2000 to 2010 has recently been agreed with the greenhouse horticulture sector. Its objective is to improve energy efficiency by 65 per cent in 2010 compared with the level in 1980. It also encourages the use of renewable energy. Overall, this is expected to reduce the growth in CO_2 emissions by 2 million tonnes in 2010. This may be achieved through the introduction of energy-saving techniques, improved energy efficiency in new construction, increasing the supply of residual heat and reducing the amount of natural gas used only to produce CO_2 for fertilization. To support these changes, the Government is making adjustments to the tax system to benefit energy efficiency investment in addition to providing f. 45 million for restructuring of the sector. Re-establishment of a subsidy programme for investments in non-industrial residual heat infrastructure will provide a further f. 75 million. Private initiatives to supply greenhouses with large amounts of CO_2 generated in industrial processes in preference to using natural gas during the summer are already under way. Officials noted that consideration is being given to a demonstration project for CO_2 storage facilities which are needed to maximize the efficiency of these initiatives. Recent improvements in the overall efficiency of this sector have been somewhat offset by growth in the size of the sector, so that CO_2 emissions have only declined slightly.

54. Changes in the agricultural sector, to a large extent attributable to changes in the EC Common Agricultural Policy, are resulting in falling livestock numbers and hence lower CH_4 emissions, although the NC2 notes that emissions per animal are on the increase. Legislation which prescribed the direct incorporation of manure into the soil had the effect of increasing sectoral N_2O emissions by 20 per cent from 1990 to 1995, but now decreases are anticipated as EC legislation on limiting nitrogenous fertilizer use takes effect.

E. Waste

55. Limited information was provided during the review on activities in the waste sector. Waste policy is designed to reduce CH_4 and CO_2 emissions through the reduction of waste

production and through changing the means of waste treatment. As a result of the 1993 Decree on Waste Disposal at Landfills, the volume of waste being landfilled is declining due to waste minimization activities, the encouragement of recycling and increased incineration. The waste programme aims to use 5.1 million tonnes of waste for energy purposes by the year 2000. A 1994 regulation on the processing of gases at landfills required that newly designed landfills should have equipment either to utilize recovered CH_4 or to flare it. By 1995 65 Gg of CH_4 was recovered, compared to 26 Gg in 1990, which exceeded the target level set for 2000.

F. Forestry

56. Based on existing forest expansion policies, under the Regional Scheme for Green Areas, only 0.1 million tonnes of CO_2 will be sequestered in 2010. The main principle of the scheme is to ensure that the number of trees planted annually exceeds the felling rate, so that in 2020 the forest will be 20 to 25 per cent larger, in terms of hectares covered, than in1995. The Netherlands can therefore only increase its future sequestration capacity if the existing objectives to expand the forest by 35,000 hectares in 2010 and 75,000 hectares in 2020 are realized more rapidly. In order to speed up the forest expansion, a system of forest certificates is being introduced equivalent to the estimated CO_2 sequestered as an added stimulus for land owners to plant forests. It is envisaged that these certificates will be purchased by target groups needing to lower their own CO_2 emissions. Officials noted that forest expansion is not a low-cost climate mitigation measure, but that forests provide other benefits.

IV. PROJECTIONS AND THE EFFECTS OF MEASURES

57. The NC2 contains emission projections for each of the main GHGs, CO_2, CH_4, N_2O, SF_6, HFCs and PFCs and also includes projections for the indirect GHGs, CO, NO_x, NMVOCs and SO_2 over the period 1990 to 2020. Revised projections for these gases over the same period are presented in the update to the NC2 and it is these numbers which are shown in this report. Both the NC2 and the update to the NC2 provide information about the key assumptions underlying the emission projections and additional information was provided in the course of the review. The figures given for 1990 and 1995 are temperature corrected and, were projections to be shown relative to an unadjusted base year, the percentage increase in emissions over time would be greater.

58. Macroeconomic forecasts and broad policy analysis developed between 1995 and 1996 formed the basis of the emission projections. This underlying work was orientated toward examining impacts on energy, land requirements, transport and the natural environment. Three scenarios were elaborated based upon different assumptions and entitled ‘divided Europe', ‘European coordination' and ‘global competition'. It is the third of these which was used in estimating the reference scenario for emission projections. In the ‘global competition' scenario, Netherlands GDP growth will be significantly higher at 3.3 per cent annually than in the more pessimistic scenarios. It is characterized by highly dynamic technological development, extensive internationalization and smoothly functioning markets.

59. In the ‘global competition' scenario, population growth will level off and the growth in the working population will decline, although labour supply will increase due to increased female participation in the labour market. The level of services as a proportion of total output is expected to increase, but at the same time manufacturing industries are expected to perform better than in the previous 20 years. This should add to the expected fall in the overall energy intensity of the economy, in contrast to previous trends. Changes in the regional distribution of workers will result in more commuter traffic. Energy demand will grow at about 1.4 per cent annually, despite increasing penetration of new, more efficient technology, resulting in an overall increase of 41 per cent between 1995 and 2020 due to economic growth and low energy prices attributable to (a) an increase in supply from countries outside the Organization of the Petroleum Exporting Countries, and (b) Netherlands energy market liberalization. Underlying energy demand growth, the demand for electricity is expected to increase faster than that for fuels as a result of the greater number of households, increased use of electrical appliances and air-conditioning in businesses. Electricity consumption may thus double between 1995 and 2020, although developments in energy prices could also result in cogeneration increasing by a factor of four.

60. Despite the expectation that growth will be lower than historic rates, the number of cars, lorries and kilometres driven will still increase considerably in the ‘global competition' scenario. The passenger car fleet will expand by up to 60 per cent by 2020 compared with 1995 and the number of car kilometres by 40 per cent, whilst road haulage kilometres could increase by 160 per cent in this period. This growth will severely exacerbate congestion and thereby further add to increasing fuel usage. Air transport of both passengers and freight is expected to rise faster than GDP growth. The total number of flights could rise from around 300,000 in 1995 to as many as 800,000 in 2020, increasing associated emissions by about 150 per cent.

61. In addition to a reference scenario, based on the ‘global competition' scenario, the update to the NC2 presents an ‘additional policy’ scenario for projections of CO_2, CH_4 and N_2O. Emission projections for CO_2, CH_4 and N_2O were mainly based on top-down econometric analysis by the National Institute for Public Health and the Environment (RIVM). Emission projections were made for the years 2000, 2010 and 2020 such that data for the years 2005 and 2015 were based upon a simple interpolation between adjacent data points. Emission projections for HFCs, PFCs and SF_6 were based on work conducted in 1993 with an outlook to 2015, so the figures for 2020 are based on a further extrapolation.

Figure IV. Projections of greenhouse gas emissions, 1990-2020, percentage change from 1990

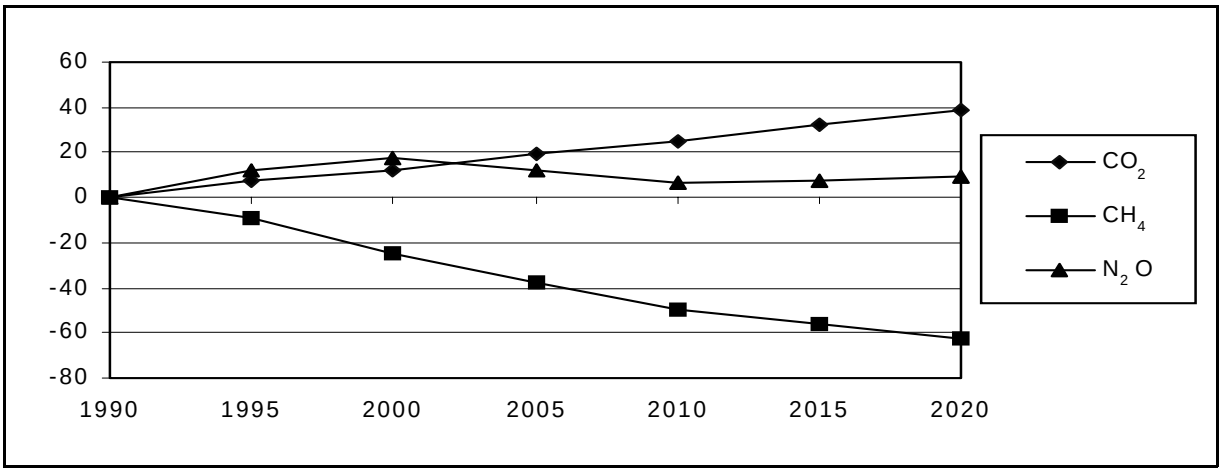
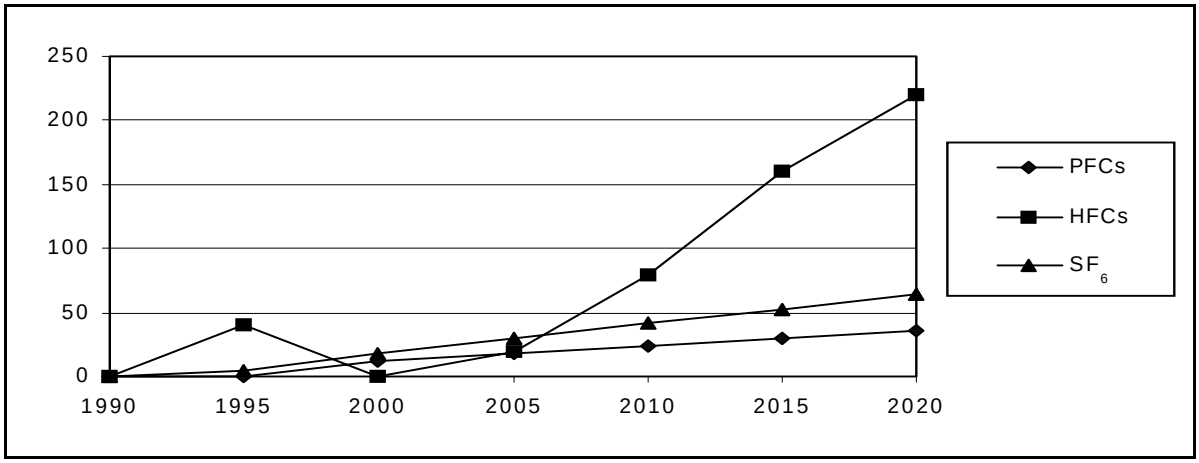


Figure V. Projections of emissions of new gases, 1990-2020, percentage change from 1990



62. Projections for the three main direct GHG emissions, CO_2, CH_4 and N_2O, based on the reference scenario, are shown in figure IV whilst projections for HFCs, PFCs and SF_6 are shown in figure V. On an aggregate CO_2 equivalent basis, these projections for the six gases show increases of 9 per cent by 2000, 16 per cent by 2010 and 28 per cent by 2020, over the 1990 level.

63. Those policies taken into account in constructing the reference scenario include long-term energy agreements resulting in a 20 per cent energy efficiency improvement from 1989 to 2020, especially in industry, the 'Action Plan for Renewable Energy', 'environmental action plans' for energy distribution companies up to 2000 affecting mainly households and small industrial plants, energy efficiency standards, annual tax deductions on energy investments of up to f.145 million, the environmental tax on fuels and the regulatory energy tax, each as outlined in the

NC2. These policies were all decided upon before 1 January 1997, so the reference approach includes only those policies to which the Government was already committed. The 'additional policy' scenario also includes the 'CO_2 Reduction Plan', increased fuel and energy taxes, an increased budget for the energy investment tax deduction of up to f. 200 million annually, exemption from the regulatory energy tax for using 'green electricity', and allowing operators to retain part of the regulatory energy tax paid on electricity produced by waste combustion.

64. It can be seen from figure IV that emissions of CO_2 are projected to increase by 13 per cent by 2000, 25 per cent by 2010 and 39 per cent by 2020, compared with 1990 levels. If compared to a 1990 base year not corrected for temperature changes, these figures would be 17 per cent, 29 per cent and 43 per cent respectively. The 'additional policy' scenario, compared with a temperature-adjusted 1990 base year, indicates that these policies would have an effect by 2005 and that CO_2 emissions may be 18 per cent higher by 2010 and 32 per cent higher by 2020. The most important factors influencing this difference are an increase in renewable energy and a further shift from coal to natural gas compared with the reference scenario. Underlying the CO_2 projections, the greatest increases are expected in the transport, agricultural and energy sectors.

65. Emissions of CH_4 in the reference scenario are expected to decrease by 25 per cent in 2000, 50 per cent in 2010 and 63 per cent in 2020, from the 1990 level. This assumes decreasing natural gas production as a result of higher imports and a reduction in fugitive emissions during production and distribution. Livestock numbers are expected to fall as the restructuring fund for intensive animal husbandry takes effect and, in the waste management sector, policies on waste prevention and recycling are expected to reduce the amount of waste landfilled in addition to increasing gas recovery. The 'additional policy' scenario does not include new policies so much as an expectation that existing policies will have an even greater impact on reducing livestock numbers. In this case, CH_4 emissions are expected to be 54 per cent lower in 2010 and 66 per cent lower in 2020 than in 1990.

66. N_2O emissions are expected in the reference scenario to increase by 17 per cent compared with 1990 levels in 2000, but to decline thereafter so that they will be 6 per cent higher in 2010 and then to rise again to be 9 per cent higher than the 1990 level by 2020. Industry is the dominant source of emissions and this assumes a very small increase in nitric acid output and no new techniques to reduce N_2O in its production. The increase in emissions up to 2000 is also due to greater use of catalytic converters in cars, but thereafter it is assumed that the warm-up time for catalysts is much shorter such that the impact of falling emission factors for N_2O is greater than that of road traffic increases. Other offsetting factors include reduced manure production as livestock numbers fall and lower consumption of chemical fertilizers in the agricultural sector. The 'additional policy' scenario assumes a greater fall in livestock numbers than otherwise, resulting in N_2O emissions being 14 per cent, 3 per cent and 9 per cent higher than 1990 levels in 2000, 2010 and 2020 respectively.

67. Emission projections for HFCs, PFCs and SF_6 assume that the Montreal Protocol and all its subsequent amendments will be fully implemented without additional measures. The projections were made at an aggregate level as insufficient information was available for a

sectoral breakdown, although the majority of emissions are thought to occur in the industrial sector. Officials noted that projections of HFCs and PFCs are particularly uncertain as it is not known how the mix of substitutes for chlorofluorocarbons and halons will develop. Emissions of HFCs are projected to be still at 1990 levels by 2000 and thereafter to increase to be 80 per cent higher by 2010 and 220 per cent higher by 2020. Projections of PFCs assume a partial closure of primary aluminium production after 2005. Compared with the 1990 level, PFC emissions are expected to be 12 per cent higher in 2000, 24 per cent higher in 2010 and 36 per cent higher in 2020.

68. The projections in the update to the NC2 were based on different policy scenarios. The NC2 showed that, without measures, CO_2 emissions could be 45 per cent higher by 2020 than in 1990 or 17 per cent higher if based on a trend scenario. CH_4 and N_2O emissions were both projected to decrease more in the update than in the NC2, which indicated a reduction of 44 per cent and 12 per cent respectively by 2020, compared with 1990.

V. VULNERABILITY AND ADAPTATION

69. As a low-lying, densely populated country, the Netherlands is highly susceptible to changes in sea-level rise and related climatic events. In particular, these could adversely affect natural beaches, dune systems and solid structures. The Netherlands could also be susceptible, *inter alia*, to an increased frequency of river floods, dry summers with higher water demand and resultant adverse effects on inland shipping, and shrinking nature reserves. There could be a positive impact in terms of improved agricultural production.

70. The NC2 provides a short description of practical measures implemented in the fields of coastal zone management, water management and nature conservation and notes that, due to uncertainties about the effect of climate change on agriculture, there are no adaptation measures in this sector. A 1995 evaluation of policy implemented for dynamic preservation of the coastline concluded that the strategy of beach nourishment was successful as almost all the 1990 coastline had been preserved. However, analysis has shown that the threat to the coastline will increase in the next decades due to sea-level rise, land reclamation plans, extraction of gas and sand and further urbanization in coastal areas. The Flood Defence Act came into force in 1996 and provides guidance on safety standards for all water defences. Every five years there is a review at ministerial level of water levels used to determine the height of dams, barriers and dikes, taking into account established safety standards for the extremely high water levels expected to occur only once in every 1,250 years along rivers and once every 10,000 years in the heart of the country. Measures in cooperation with neighbouring countries relating to land-use etc. are designed to limit the likelihood of river flooding. For ecological reasons, the Government has developed a national network of interconnected nature conservation areas. Their overlap may permit or facilitate the migration of certain species thereby giving the ecosystem an opportunity to adapt to climate change.

71. In the international arena, the Netherlands is actively participating in activities in the fields of impacts, vulnerability and adaptive measures for coastal zone management. It offers relevant knowledge to the international community and, in particular, to developing countries.

The team noted that the Netherlands not only disseminates information to these countries but aids in the training of experts.

VI. FINANCIAL ASSISTANCE AND TECHNOLOGY TRANSFER

72. Following a restructuring of foreign policy in 1996, the Netherlands committed itself to allocating 0.8 per cent of GDP to official development assistance, which in 1997 amounted to about f.. 6,000 million, and it also pledged that, of this, 0.1 per cent of GDP would go to environmental projects and programmes in developing countries. Such projects are being delivered through a combination of multilateral and bilateral channels. The Netherlands contributes to various multilateral and intergovernmental institutions assisting developing countries, including the World Bank, the United Nations, the European Commission, and regionally oriented institutions such as regional development banks. Where appropriate, the Government also provides some funding to non-governmental organizations working in developing countries.

73. Up to 2000, the Netherlands set aside f. 120 million from its development cooperation budget to contribute to the Global Environment Facility . The team was told that the Netherlands will continue its support for major multilateral institutions in the field of climate change such as the IPCC, the IPCC/OECD National Greenhouse Gas Inventories Programme, and UNFCCC. Furthermore, the Netherlands contributes to several international scientific programmes concerned with climate change, including the World Climate Research Programme, the International Geosphere-Biosphere Programme and the International Human Dimensions of Global Environmental Change Programme. Another priority is to further strengthen international coordination and research via participation in the International Group of Funding Agencies for Global Change Research.

74. In 1996, the Netherlands Development Cooperation Department started a Climate Study Programme aimed at assisting non-Annex 1 Parties in formulating climate change policy and providing them with assistance in drafting first national communications. The first seven countries to participate in the programme were Bolivia, Costa Rica, Ecuador, Ghana, Senegal, Suriname and Yemen. The Netherlands has also made a commitment to help several countries carry out climate change vulnerability assessments. The team was informed that vulnerability assessments have been carried out with Bangladesh, Egypt, Poland and Viet Nam and are being followed up with assistance for coastal zone management.

75. The Netherlands supports various projects in countries with economies in transition, mainly related to efficient energy use. In particular, the project entitled Supporting the Cooperational Organization of Rational Energy Use, initially involving Hungary, Latvia and Poland, is designed to identify cost-effective energy saving measures which may be implemented either through joint implementation or under the Programme of Eastern European Cooperation.

VII. ACTIVITIES IMPLEMENTED JOINTLY

76. In 1995, the Activities Implemented Jointly Pilot Phase Programme was established, designed to cover all greenhouse gases. The programme is administered by several ministries, with the environment ministry responsible for developing a system for tracking emissions, for certification of the results and for the compilation of annual reports. The programme includes incentives for industry. The team was informed, for example, that in return for finding and registering projects in the programme, Netherlands companies will be able to use the emission reduction or sequestration in future agreements with the Government.

77. At the time of the review, the Netherlands had several AIJ projects under way. They included Bhutan (micro-hydroelectric plant), the Czech Republic (reforestation), Ecuador (afforestation), Hungary (fuel switch in transport and demand-side management), Romania (energy savings at power stations), the Russian Federation (landfill gas recovery and energy-saving horticulture) and Uganda (afforestation). The team was advised that the Netherlands has identified potential AIJ projects with China (cogeneration in the sugar industry), Honduras (energy efficient lighting), India (biogas), Morocco (solar energy as a source of rural energy) and Peru (street lighting). The team also noted the Netherlands commitment to working with central and eastern European countries on AIJ projects.

VIII. RESEARCH AND SYSTEMATIC OBSERVATION

78. The Government funds a broad range of research, systematic observation and monitoring related to climate change. The research is carried out in partnership with universities or government departments with expertise or responsibilities in research. Some of the national research programmes supporting climate change are: the National Research Programme for Global Air Pollution and Climate Change (NRP), the Netherlands Organization for Scientific Research global change programme, the National Remote Sensing Programme and the Earth Observation User Support Programme.

79. The NRP supports and guides research in the Netherlands. The first phase (1990-1995) concentrated on areas such as understanding the climate system, anthropogenic sinks and sources, estimation of impacts on terrestrial and aquatic ecosystems, regional hydrology, risk assessment and technological transfer and social response strategies.

80. The team was informed that the second phase (with a budget of f. 47 million funded to 2001) has shifted the focus from systems to policy-oriented research and will concentrate on four themes. They are: dynamics of the climate system and its components (33 per cent of the budget), vulnerability of natural and social systems to climate change (22 per cent), societal causes and solutions (29 per cent), and integration and assessment (16 per cent).

81. In 1995, the Netherlands established the Centre For Climate Change Study. The Centre aims to enhance the quality and impact of climate change research in the Netherlands, and research inclimate variability and the atmospheric composition of climate processes. It is also designed to strengthen the international position of the Netherlands climate research.

82. In the years to come, besides research on the scientific aspects of the climate system, the Netherlands contribution to international research will be aimed at finding global and regional strategies in the long term to satisfy its commitment under the UNFCCC, with global integrated models playing an important role. The team noted that, to support the relevant protocols and scenario studies, an insight into the cost-effectiveness of measures for emission reduction and adaptation and into the effectiveness of administrative instruments will be required.

IX. EDUCATION, TRAINING AND PUBLIC AWARENESS

83. With the waning uncertainty about the reality of climate change and its causes, the Netherlands has shifted the emphasis of its public awareness strategy to gaining support for climate change policies. This strategy includes mass-media information campaigns, school education, publications and dialogue between science and policy organizations.

84. The team noted that the Netherlands tradition of consultation and consensus building between policy makers, local and regional authorities, researchers, non-governmental organizations and the public in planning and implementing socially important measures ensures a relatively high level of awareness of climate change policy. In addition, the team noted that all stakeholders participate in the dissemination of information on climate change.

85. The Government is committed to educating the public on climate change. In 1996 the Ministry of the Environment began a long-term mass media campaign on the greenhouse effect and the need for energy conservation. The Government has also conducted campaigns to inform both children and adults about energy efficiency and to gain acceptance of the increased energy tax. The team was shown television commercials and magazine advertisements designed to educate the public on some of the measures already taken by industry to improve efficiency and reduce greenhouse gas emissions. Energy companies promote green electricity and energy conservation in the residential sector. This is complemented by increasing use of energy labels on white goods such as refrigerators and washing machines. In secondary schools, children have been taught about the link between energy and the environment and some schools have engaged in energy conservation projects.

86. The team was also advised about campaigns geared to changing consumer patterns such as reducing driving speed and encouraging the use of public transport. The team was informed that the Netherlands measures the effectiveness of its advertising campaigns and updates its communication strategy accordingly. Recent research indicates that a large portion of the public is confused about climate change in linking it with ozone depletion.

87. The Netherlands publishes and distributes internationally, free of charge, several regular journals. These include the bimonthly *Change* research and policy newsletter on global change, and the *Joint Implementation Quarterly*. Some planning models and databases, such as ICARUS, are also available to the international climate change community and interested users. In addition, the Netherlands has organized or supported several international conferences in central and eastern Europe, and in developing countries to help with the exchange of information on climate change.

X. CONCLUSIONS

88. The review team was of the opinion that the NC2, its update and GHG inventory submissions provide a comprehensive picture of the Netherlands' activities related to climate change. The team formed the impression that the Government has succeeded in formulating a coherent national policy aimed at mitigating GHG emissions. This policy is based on broad participation by industry and the general public and is characterized by a high level of awareness of various climate related issues.

89. The team was impressed with the scope and quality of the work done in preparing the GHG inventory. Thanks to ongoing research aimed at improving scientific knowledge and confidence in emission factors as well as to the reliable and comprehensive national statistical system providing activity data, a detailed GHG inventory of high quality could be produced for the whole period under review. The team noted, however, that some gaps still exist and recent recalculations indicate that further work may be needed to fill those gaps as well as reduce uncertainties in some sectors.

90. The trends in GHG emissions were not always easy to interpret, since in a number of sectors and gases they apparently followed the business cycle and/or were affected by climatic conditions, e.g. severe winters. However, the clear upward trend which could be observed in total CO_2 emissions up to 1996 appears to have reversed in the last two years. The team was not able to form an opinion regarding the extent to which these recent reductions were due to the implementation of policies and measures related to CO_2. It was clear, however, that measures implemented so far have affected emissions of methane, which have fallen by more than 17 per cent since 1990.

91. Voluntary agreements remain the cornerstone of the national climate change policy. The team noted the willingness of industry and the business community as a whole to work closely with the Government in achieving emission reduction targets. Flexible use of regulatory and fiscal mechanisms, in the view of the team, would allow the Netherlands to implement the majority of measures and achieve its goals. The process of liberalization and privatization taking place in the electricity and gas sectors offers many opportunities for increasing energy efficiency and the team was of the opinion that the Government intends to use these opportunities in an optimal and systematic way. The team was assured that the commitments under the Kyoto Protocol are taken seriously by the Government and that additional measures are being considered if the present course of action is not enough to achieve the emission reduction targets.

- - - - -